TRANSPORTATION CONTROL MEASURES

An analysis of potential Transportation Control Measures for implementation in the Pennsylvania portion of the DVRPC region

May 1994

Delaware Valley Regional Planning Commission
The Bourse Building - 8th Floor
111 S. Independence Mall East
Philadelphia, Pennsylvania 19106-2515

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Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties as well as the City of Philadelphia in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey. The Commission is an advisory agency which divides its planning and service functions among the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Information Services Center, which includes the Office of Regional Planning, and Finance and Administration. DVRPC's mission for the 1990s is to emphasize technical assistance and services and to conduct high priority studies for member state and local governments, while determining and meeting the needs of the private sector.

The DVRPC logo is adapted from the official seal of the Commission and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River flowing through it. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey. The logo combines these elements to depict the areas served by DVRPC.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

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The Pennsylvania portion of the DVRPC region including Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties

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Clean Air Act Amendments of 1990, Transportation Control Measures, State Implementation Plan, test scenarios, Travel Demand Management Evaluation Model, Post-Processor for Air Quality, sketch planning techniques, emissions reduction, cost-effectiveness

ABSTRACT

This report presents the results of COMSIS' evaluation of thirty-seven Transportation Control Measures for implementation in the Pennsylvania portion of the DVRPC region. COMSIS used its own Travel Demand Management Evaluation Model, DVRPC's regional travel simulation model, MOBILE5a, Garmen Associates' Post-Processor for Air Quality, and sketch planning techniques to estimate the changes in travel (work travel, total travel, and VMT) and emissions (VOCs, CO, and NO_x) that would result if each measure were implemented. The costs and cost-effectiveness of implementing and operating each measure were also calculated.

For More Information Contact:

Delaware Valley Regional Planning Commission
Regional Information Services Center
The Bourse Building - 8th Floor
111 S. Independence Mall East
Philadelphia Pa. 19106-2515
(215) 592-1800

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INTRODUCTION

The Clean Air Act Amendments of 1990 require severe and above ozone nonattainment areas, such as the Philadelphia Region, to implement Transportation Control Measures (TCMs) to help reduce emissions from highway vehicles. In anticipation of including TCMs in upcoming State Implementation Plan (SIP) revisions, the Pennsylvania Department of Transportation retained COMSIS, a transportation consultant, to assist DVRPC in specifying potential TCMs and analyzing their effects on trip making, travel, and emissions. This report presents the results of COMSIS' analysis.

Thirty-seven potential TCMs, or *test scenarios*, were evaluated. The test scenarios are not actual projects, but rather representative applications of the various broad categories of TCMs. Since this analysis was being performed in preparation for Pennsylvania's SIP revisions, the scenarios were limited to the Pennsylvania portion of the DVRPC region. In addition, the analysis focuses primarily on projects that could provide a substantial portion of their emissions reduction benefits by 1996 — the year by which a 15% reduction in VOCs must be achieved.

COMSIS used its own Travel Demand Management Evaluation Model, DVRPC's regional travel simulation model, MOBILE5a, Garmen Associates' Post-Processor for Air Quality, sketch planning techniques, and various combinations of these methods to estimate the changes in travel (work travel, total travel, and VMT) and emissions (VOCs, CO, and NO_x) that would result in the five-county Pennsylvania region if each measure were implemented. The costs and cost-effectiveness of implementing and operating each measure were also calculated.

RESULTS AND CONCLUSIONS

Table 1 (Page 3) lists all of the scenarios that were tested and ranks them according to their annual emissions reduction. Their corresponding cost-effectiveness ranking is also provided. The analysis clearly reveals that certain types of strategies are more effective than others. Of the 37 strategies tested, the pricing measures (gas tax, VMT tax, regional parking charge, and parking tax in the CBD) show the most emissions reduction potential and are the most cost-effective (in fact, these strategies are revenue-producing). Also exhibiting high emissions reduction potential and cost-effectiveness are the ETRP and related strategies, educational efforts, and low-emission vehicles/fuels. Transit capital improvements, such as rail service extensions and restorations, have the lowest emission reduction potential and the lowest near-term cost-effectiveness. The analysis highlights various types of strategies

that could be classified as moderately effective, including bicycle improvements, advanced signal system improvements, ramp metering, limits on new parking facilities, and removing pre-1980 vehicles. Figure 1 illustrates the range of cost-effectiveness for the different types of strategies.

The ease of implementing the different emission reduction strategies will vary greatly. Strategies that require state initiation or legislative action, or that will spur public opposition, will be the most time-consuming and difficult to implement. Pricing strategies and technological measures, which are the most effective strategies, along with many strategies that require behavioral change, fall into this category. Projects that can be carried out at the regional level, such as transit improvements, bicycle improvements, selected measures to reduce traffic congestion and delay, financial support for ridesharing and other transportation demand management programs, and educational programs, will be much easier to implement.

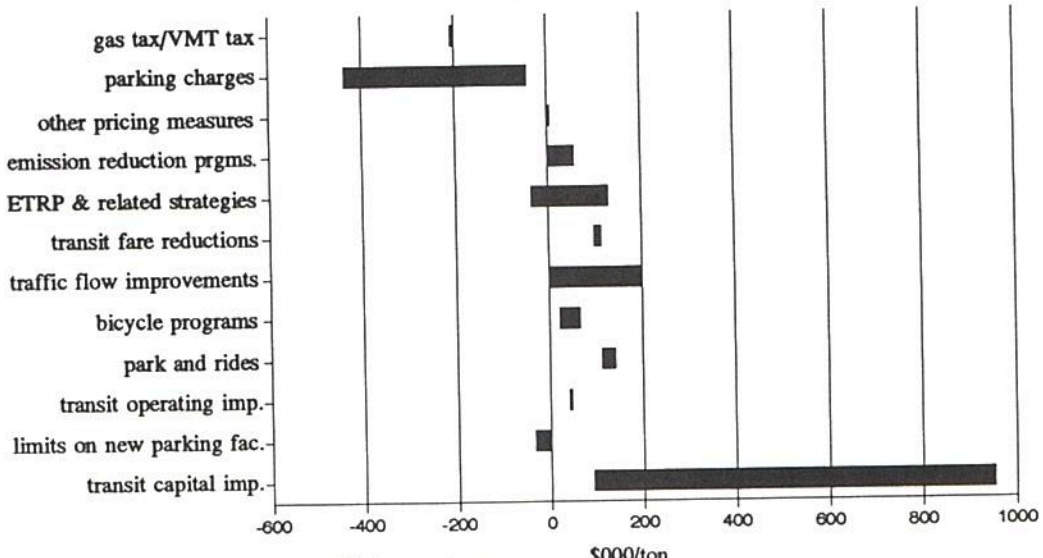
DVRPC's role in project implementation will depend on strategy type. For strategies that are the State's responsibility, DVRPC's role may be limited to adopting a resolution of endorsement or support. For strategies that can be initiated at the regional level, DVRPC will be actively involved in transforming the test scenarios into actual projects, building consensus for the projects, and carrying them through the planning and programming process.

The figures presented in this report are only *estimates*; they should not be considered precise *measurements*. The analytical methods used in the study are not perfect and assumptions must be made frequently throughout the process. The estimates should be used to gauge the relative effectiveness of the different types of strategies and serve as an indicator of the emissions reduction potential for a class of TCMs. In addition, when comparing the effectiveness of the measures, it is important to be familiar with the project definition and scope that is provided in Section 2. The test scenarios differ in scale and are not always directly comparable. Some of the sample applications are applied region-wide and have greater potential for impact than do those which are more localized.

The TCM analysis provides a valuable base of information with which to form policy recommendations that will guide the content of future SIPs, Transportation Improvement Programs, Transportation Plans, and Work Programs. □

Figure 1

Ranges of Cost-Effectiveness



* Negative values indicate measures which generate revenue.

Table 1
Test Scenarios Ranked in Order of Emissions Reduction with Corresponding Cost-Effectiveness Ranking

ID #	Test Scenario	Rank of TCMs Sorted by Total Emissions Reduction	Rank of TCMs Based on Cost-Effectiveness	Change in Annual Total Emissions (tons) (a)
35	$.84 per gallon gas tax	1	2	-3486
36	$.04 per vehicle mile travelled tax	2	3	-3486
31	Removal of 50% of pre-1980 vehicles	3	21	-1863
24	$3 parking surcharge paid by all regional employees	4	1	-1100
17	Implementation of PA ETRP (all APO targets reached)	5	5	-998
32	Reduction in cold starts	6	9	-402
33	California cars	7	13	-341
20	Telecommuting	8	15	-317
25	$3 parking tax in Philadelphia CBD	9	4	-301
11	50% system-wide transit fare reduction	10	27	-289
5	Enforce 55 mph speed limit on PA Turnpike	11	14	-201
30	Bike captures 5% of non-work trips ≤ 5 miles	12	17	-169
18	Comprehensive regional ridesharing program	13	12	-156
21	Compressed work weeks (9/80)	14	7	-119
10	20% system-wide transit fare reduction	15	24	-115
34	Feebate on new car purchase	16	11	-114
4	Ramp metering	17	10	-112
28	Bike captures 5% of auto work trips ≤ 5 miles	18	20	-98
1	Advanced signal system on 4-lane arterials	19	16	-77
27	Expand parking at rail stations	20	28	-75
19	$25 TransitChek	21	31	-65
9	10% system-wide transit fare reduction	22	25	-56
15	Improve City Transit Division service	23	18	-46
12	Improve suburban bus service	24	19	-42

ID #	Test Scenario	Rank of TCMs Sorted by Total Emissions Reduction	Rank of TCMs Based on Cost-Effectiveness	Change in Annual Total Emissions (tons) (a)
23	Limit parking facilities at new suburban employment sites	25	6	-41
3	CIMS on interstate system	26	33	-39
26	New park and ride lots along highways	27	32	-35
2	Advanced signal system in Philadelphia CBD	28	30	-16
8	Improvement to express service on regional rail lines	29	26	-11
16	Philadelphia to Harrisburg rail service improvements	30	34	-10
13	Apply "Transit-First" in Philadelphia CBD	31	29	-9
6	Restoration of service on regional rail lines	32	35	-8
14	Reuse surplus LRVs on bus routes in Philadelphia	33	23	-4
37	Facility pricing (double turnpike tolls during peak periods)	34	8	-2
29	Bike captures 5% of access trips ≤ 5 miles for work purposes to 14 rail stations	35	22	-1
7	Extension of Route 66 trackless trolley	36	36	-1
22	Prohibit new parking facilities in Center City	37	37	Negligible Impact

(a) Total Emissions = VOC + NO_x

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION

This report was written by the Delaware Valley Regional Planning Commission under contract to the Pennsylvania Department of Transportation.

May 1994

1 INTRODUCTION

In anticipation of including Transportation Control Measures (TCMs) in Pennsylvania's 15% State Implementation Plan (SIP) revision due on November 15, 1993, the Pennsylvania Department of Transportation retained COMSIS, a transportation consultant, to assist DVRPC in specifying potential TCMs and analyzing their effects on trip making, travel, and emissions. This report presents the results of COMSIS' analysis.

The potential TCMs, or *test scenarios*, that were evaluated were suggested by a series of *white papers* completed by DVRPC in 1992. The white papers examined the broad TCM categories specifically listed in the 1990 Clean Air Act Amendments and considered their applicability to the Delaware Valley region. To evaluate the potential of the measures for reducing emissions, it was necessary to represent each TCM category by one or more test scenarios. The test scenarios enable the desired TCM application to be described in enough detail to make calculating its travel and emissions impacts possible.

The list of scenarios that developed from the white papers was supplemented and refined by COMSIS and the TCM Working Group of the CMAQ Subcommittee of the Regional Transportation Committee to ensure that a comprehensive set of measures was represented. In all, 37 scenarios were identified for testing. Since this analysis was being performed in preparation for Pennsylvania's SIP revision, the scenarios were limited to the Pennsylvania portion of the DVRPC region. In addition, the analysis primarily focused on projects that could provide a substantial portion of their emission reduction benefits by 1996 — the year by which the 15% reduction in VOCs must be achieved. The test scenarios are listed in Table 2.

COMSIS used its own Travel Demand Management (TDM) Evaluation Model, DVRPC's regional travel simulation model, MOBILE 5a, Garmen Associates' Post-Processor for Air Quality (PPAQ), sketch planning techniques, and various combinations of these methods to estimate the changes in travel (work travel, total travel, and VMT) and emissions (VOCs, CO, and NO_x) that would result in the five-county Pennsylvania region if each measure were implemented. The costs and cost-effectiveness of implementing and operating each measure were also calculated.

An important point to keep in mind is that the scenarios that were tested are not actual projects, but rather representative applications of the various categories of TCMs. In addition, the figures presented in this report are only *estimates*; they should not be considered precise *measurements*. The analytical methods used in the study are not perfect and assumptions are made frequently throughout the process. The figures should be used to gauge the relative effectiveness of the different types of strategies and serve as an indicator of the emissions reduction potential for a class of TCMs. Even though it has been since determined that TCMs will not be needed in the 15% SIP, knowing which types of strategies are likely to have significant emissions impacts and are cost-effective will contribute to the development of meaningful and effective projects that will be incorporated into future SIP revisions.

Section 2 of the report presents worksheets for each test scenario. The worksheets include a description of the measure and brief explanations of the travel, emissions, and cost analyses. Section 3 contains the results of the analysis in the form of summary tables and graphs. Policy implications and directions are discussed in Section 4. Detailed descriptions of the COMSIS TDM Model, the sketch planning techniques, and the PPAQ parameters, and a listing of the reports used for background information are found in the appendices.

Table 2
Transportation Control Measures
Scenarios for Testing in 1993

	TRAFFIC FLOW IMPROVEMENTS
1	Advanced signal system improvements on four-lane arterials with the highest peak volumes
2	Advanced signal system improvements — Comprehensive system for Philadelphia CBD
3	Congestion and incident management systems on interstates within Philadelphia and the four suburban counties
4	Ramp metering
5	Enforce adherence to 55 mph speed limit on freeways
	TRANSIT OPERATIONS
6	Restoration of service on regional rail lines
7	Extension of the Route 66 trackless trolley
8	Improvement to express services on regional rail lines
9	System-wide fare reductions of 10% from current levels
10	System-wide fare reductions of 20% from current levels
11	System-wide fare reductions of 50% from current levels
12	Improve suburban bus service
13	Application of "transit first" principles to selected bus and light rail lines in Philadelphia
14	Reuse of surplus light rail vehicles and trackless trolleys on bus routes in Philadelphia
15	Improve City Transit Division service
16	Philadelphia to Harrisburg rail service improvements
	TRANSPORTATION MANAGEMENT PLANS
17	Implementation of the PA Employer Trip Reduction Program (all APO targets reached)
18	Comprehensive regional ridesharing program
19	Availability and promotion of $25 TransitChek

Table 2 (continued)

20	Telecommuting
21	Compressed work weeks (9/80)
	PARKING MANAGEMENT
22	Prohibit new construction of parking facilities in Center City Philadelphia
23	Limit parking facilities at new suburban employment sites
24	$3 parking surcharge paid by all regional employees arriving in private vehicles
25	$3 parking tax in the Philadelphia CBD with the rate based on time of day
26	Construct new park-and-ride lots along highways
27	Expand parking at rail stations
	NON-MOTORIZED PROGRAMS AND FACILITIES
28	Comprehensive bicycle improvements in the region that would capture 5% of auto work trips with a length of 5 miles or less
29	Comprehensive bicycle improvements in the region that would capture 5% of access trips of 5 miles or less for work purposes to 14 selected rail stations
30	Comprehensive bicycle improvements in the region that would capture 5% of non work trips with a length of 5 miles or less
	EMISSIONS REDUCTION PROGRAMS
31	Removal of 50% of pre-1980 vehicles
32	Reduction in cold starts
33	California cars
	PRICING MECHANISMS
34	Feebate on purchase of new car
35	Comprehensive gas tax of $.84 per gallon
36	$.04 per vehicle mile travelled tax
37	Facility pricing (double Turnpike tolls during peak periods)

2 WORKSHEETS

The purpose of the worksheets is to provide brief yet detailed descriptions of each potential TCM along with documentation on how its impacts were analyzed. Each worksheet is divided into three sections — definition, travel and emissions analysis, and cost methodology.

The worksheets evolved over the course of the study. Initially, they were used for discussion purposes in review committee meetings in an effort to more clearly define each test scenario. As part of this on-going process, the worksheets alternated between DVRPC and COMSIS for clarification and refinement. DVRPC mainly contributed to the definition section, while COMSIS was responsible for the emissions analysis and cost sections. In their final form, the worksheets include enough information to understand the intent of each measure and the rationale behind its analysis.

1

ADVANCED SIGNAL SYSTEM IMPROVEMENTS ON FOUR-LANE ARTERIALS WITH THE HIGHEST PEAK VOLUMES

Definition:

The purpose of this TCM is to improve flow on congested arterials through improved signalization. Improved signal systems would be introduced on the 50 most congested miles of 4-lane arterials in the region.

Specific facilities targeted for these treatments are:

Broad St./PA 611/PA 291 from US 1/Roosevelt Blvd. to I-95 (11 miles)

US 1/Roosevelt Blvd. from Broad St./PA 611 to I-276/PA TNPK (15 miles)

US 1/City Line Ave. from I-76 to PA 320 (11 miles)

PA 3/West Chester Pike from I-476 to Cobbs Creek Parkway, and Walnut St./Chestnut St. from Cobbs Creek Parkway to the Schuylkill River (11 miles)

Travel and Emissions Analysis:

This TCM's impact was judged to be purely in the improvement of flow conditions resulting in higher average speeds which equate to lower rates of vehicle emissions. There was assumed to be no substantive impact through these improvements on modal split or trip generation. However, allowance was made for differences in trip length and VMT resulting from route shifting due to improved speeds on affected routes.

Based on conversations with local operations staff, and subsequent discussions between COMSIS and DVRPC staff, it was concluded that the types of improvements defined under this TCM would result in an average increase in speeds of 10% on all affected links as well as a 10% increase in capacities. COMSIS created link update records reflecting these improvements and sent the file to DVRPC for network modification and assignment.

DVRPC ran a network update and traffic assignment using the base 1996 vehicle trips and the modified 1996 no-build network. Results of the assignment were sent to COMSIS for calculation of emissions impacts using PPAQ.

Cost Methodology:

The public cost would consist of both a capital component and an operating/maintenance component. The capital cost assumed four signalized intersections per mile at a cost of $50,000 each. This capital cost would be incurred to upgrade existing traffic signals. The improvements were assumed to have a ten-year life. An 8% discount rate was used to calculate an annual cost. The operating/maintenance cost per traffic signal was assumed to be $1,500.

2

ADVANCED SIGNAL SYSTEM IMPROVEMENTS — COMPREHENSIVE SYSTEM FOR PHILADELPHIA CBD

Definition:

This TCM would attempt to improve traffic flow operations in the Philadelphia CBD through improved signalization and flow channelization. The effects would be to reduce delay and increase speeds, thereby reducing emissions.

The following street system is affected by this plan:

Delaware Ave. to 40th Street
Spring Garden to South Street

Travel and Emissions Analysis:

As with TCM 1, the impact of this TCM was adjudged to be in improved speeds through less queuing and delay. Following discussions with DVRPC, City of Philadelphia, and PennDOT staff, it was decided that these improvements would result in roughly a 6.5% increase in link speeds.

DVRPC first identified locations for improved signal systems installation from the Center City Signal Improvement Project Feasibility Study. COMSIS then used "CBD" area type and "Philadelphia" jurisdiction identifiers to select the affected roadway links. COMSIS created link update records reflecting improvements in speed and capacity as a result of reduction in delays and time required to traverse these links.

The link updates were sent to DVRPC for network update and traffic assignment using the 1996 base vehicle trip table. The revised assignment was then sent to COMSIS for calculation of emissions effects using PPAQ.

Cost Methodology:

This element included both the Stage I and Stage II of the Center City Traffic System. The capital costs were taken from the FY 1994 - 1999 Transportation Improvement Program (TIP). There would be no additional operation/maintenance costs associated with these improvements.

3

CONGESTION AND INCIDENT MANAGEMENT SYSTEMS ON INTERSTATES WITHIN PHILADELPHIA AND THE FOUR SUBURBAN COUNTIES

Definition:

This TCM would aim to reduce the "catastrophic" delay caused by major traffic stoppages, or incidents, caused by accidents or breakdowns. This random type of system failure in an already-congested highway system produces major -- but unpredictable -- delays. An Incident Management system attempts to rapidly identify these incidents and alleviate them through: (a) a high state of readiness which removes obstructions and (b) traveler information which suggests routing alternatives.

In preliminary research, it was determined that PennDOT's Traffic and Incident Management System (TIMS) program is targeting the 115 miles of interstate roads that serve the five-county Philadelphia region for incident management treatment. The systems likely to be in place by 1996 are:

I-476: 357 detectors and 8 CCTV cameras;

I-95: 4 changeable message signs and 12 CCTV cameras;

I-676: 7 CCTV cameras, 3 changeable message signs, 4 detectors, and a Control Center.

(Note: Ramp Meters are considered separately from TIMS in the next TCM.)

Travel and Emissions Analysis:

A methodology was developed to approximate the effect incident management would have on system performance. This methodology consisted of the following assumptions:

- It was reasoned that incidents are responsible for over 50% of delay on freeways. An estimate was then made of the percentage of that delay that might be eliminated through incident management -- again 50%. The effect on system performance was then estimated to be:

Uncongested freeway speed:	60 mph	1.0 min/mile
DVRPC base freeway speed:	33.3 mph	1.8 min/mile
Total delay:		0.8 min/mile

Delay due to incidents (50%):		0.4 min/mile
50% reduction in incident delay:		0.2 min/mile
New delay:		0.6 min/mile
New base freeway speed:	37.5 mph	1.6 min/mile
Net change in speed:	***+4.2 mph***	

- Comparing this estimate with freeway speeds on the DVRPC network, it was concluded that this estimate was of a reasonable order of magnitude, and a net increase in speed of **5%** was agreed to.

- Specific freeway and ramp locations where TIMS would be implemented were identified by DVRPC. Speed and capacity changes were then made by COMSIS and a file of link update records was transmitted to DVRPC for network update and traffic assignment using the base 1996 vehicle trip table. The assignment results were transmitted to COMSIS for calculation of emissions effects using PPAQ.

Cost Methodology:

There are four projects included in this element. Two of the projects are already part of the 1994 - 1996 Transportation Improvement Program and the remaining two projects are contained in the 1992 JHK study. The capital costs of $31,720,000 were obtained from these sources and assumed to have a ten-year useful life for calculation of annual capital costs. An 8% discount rate was used in the annual cost calculation. Annual operations/maintenance costs were assumed to be 10% of total capital costs.

4

RAMP METERING

Definition:

This TCM would attempt to improve flow on major limited access facilities by "metering" access of entering traffic so as to not disrupt the delicate flow balance of traffic levels that are approaching capacity conditions. 17 ramp locations in the region would be metered to pace entry of mixed traffic.

Preliminary research indicated that the following ramp meters identified in PennDOT's TIMS program would be in place by 1996:

I-476 - 16 ramp meters
I-676 - 1 ramp meter

Travel and Emissions Analysis:

This TCM's impact was judged to be purely in the improvement of flow conditions resulting in higher average speeds, which equate to lower rates of vehicle emissions. There was assumed to be no substantive impact through these improvements on modal split or trip generation. However, allowance was made for differences in trip length and VMT resulting from route shifting due to improved speeds on affected routes.

Based on conversations with local operations staff, and subsequent discussions between COMSIS and DVRPC staff, it was concluded that the type of improvements defined under this TCM would result in an average increase in speeds of 6 mph on the freeway links adjoining the ramps that are planned to be metered. Initially, consideration was given to quantifying the effects of HOV bypass of the ramp meters. This was not done due to the fact that ramps are not explicitly coded in the DVRPC network.

COMSIS created link update records reflecting these improvements and sent the file to DVRPC for network modification and assignment. DVRPC ran a network update and traffic assignment using the base 1996 vehicle trips and the modified 1996 no-build network. Results of the assignment were sent to COMSIS for calculation of emissions impacts using PPAQ.

Cost Methodology:

The ramp metering interchanges are included in the larger PennDOT TIMS project. For TCM comparison purposes, each of the 17 ramps to be metered was assumed to cost $50,000. In

addition, a $1 million enhancement and expansion of the present centralized control system would be required. The annual operations and maintenance cost of $1500 per ramp was assumed. Capital costs are amortized over a ten-year period using an 8% discount rate.

5

ENFORCE ADHERENCE TO 55 MPH SPEED LIMIT ON FREEWAYS

Definition:

Emissions are very sensitive to vehicle speed. Vehicles exceeding 55 mph are generating considerably more emissions than those travelling at the speed limit. This TCM would try to increase adherence to the 55 mph limit through increased enforcement, with the objective of attaining 85% adherence.

This measure was restricted in definition to apply only to the Pennsylvania Turnpike, where it appears that speeds regularly exceed 55 mph at all times of day (whereas on other Class 1 facilities, speeds may not exceed 55 during peak periods). Therefore, this measure has been applied to the PA Turnpike only as a "demonstration" project.

Analysis:

For this analysis it was presumed that the current average speeds on the Pennsylvania Turnpike (all segments within the DVRPC region) are 65 mph, and that under increased enforcement, 85% would adhere to 55 mph (remainder at 65 mph), resulting in a new average speed of 56 mph.

No new assignment runs reflecting these altered speeds were made. Instead, these new speeds for the turnpike links were adjusted directly within PPAQ and revised regional emissions calculated directly from the change in speeds.

Cost Methodology:

This measure increases enforcement of the 55 miles per hour speed limit on 192 directional (total one-way) miles of the Pennsylvania Turnpike. It was assumed that one trooper would be required for each ten directional miles, thereby requiring 19.2 troopers. The annual cost for the trooper and the cruiser was estimated to be $100,000. In addition, there would be an annual campaign costing $500,000 to inform the public of the added speed limit enforcement and the higher emissions caused by excessive speeds. There is no revenue assumed in this analysis, since the additional citations are offset by increased cost of adjudication.

6

RESTORATION OF SERVICE ON REGIONAL RAIL LINES

Definition:

SEPTA has an extensive system of rail lines throughout the region. Service has been terminated on some of these lines or segments in the recent past due to low ridership and cost considerations. This TCM attempts to increase regional transit utilization by restoring rail service on several of these prior routes.

The lines targeted for restoration of service by 1996 are:

R3-Elwyn to Wawa
R6-Cynwyd to Ivy Ridge
R8-Fox Chase to Newtown

Travel and Emissions Analysis:

To quantify the travel impacts related to these service adjustments, it was assumed that service levels on the restored portions would be the same as those on the currently active portions.

These changes in service were made by DVRPC in the regional travel network and the ridership effects calculated through the regional mode choice model. DVRPC then performed a new regional assignment, and transmitted the assignment results to COMSIS for emissions estimation with PPAQ.

Cost Methodology:

The restoration of regional rail lines by 1996 assumed that the infrastructure (track, electrical substations, stations/platforms, and parking areas) would require a capital investment of $45 million to permit operations once again. In addition, rail vehicles were assumed to be available, since, in 1991 there was a 24% commuter rail spare ratio. Also, it is assumed that operating and maintenance costs would be slightly higher than the rail system average (10% higher) and that the farebox revenue would be at the system wide average: operating expense per passenger trip = $7.28, and revenue per trip = $3.20. The capital cost was amortized over 20 years with an 8% discount rate.

7

EXTENSION OF THE ROUTE 66 TRACKLESS TROLLEY

Definition:

This TCM would extend the Route 66 trackless trolley from its current terminus at Frankford Avenue and the City line to Franklin Mills Mall.

Travel and Emissions Analysis:

This TCM was evaluated using the same basic procedure as outlined for TCM 6, with primary travel impacts estimated by DVRPC through modification of the transit network and application of the regional mode choice model.

Ridership and mode shifts were estimated by DVRPC using the regional mode choice model, and the results taken through a new regional assignment. Assignment results were then sent to COMSIS for emissions calculation with PPAQ.

Cost Methodology:

This measure extends the Route 66 trackless trolley two miles from its current terminus at Frankford Avenue and the City Line to Franklin Mills Mall. The methodology assumed that the electric power for the trackless trolley requires a capital investment of $12.5 million, which is amortized over 20 years at an 8% discount rate. There would be sufficient surplus vehicles to operate the service extension. Systemwide averages were assumed: Operating cost per passenger = $0.77, revenue per passenger = $0.34 per passenger (or 4.4% average recovery rate).

8

IMPROVEMENTS TO EXPRESS SERVICE ON REGIONAL RAIL LINES

Definition:

This TCM would attempt to increase transit utilization on regional rail lines through the improvement of express service.

This TCM would affect the following lines with the indicated service improvements:

R3 (West Trenton):

5% reduction in peak period run time
25% reduction in peak period headways

R5 (Paoli and Lansdale):

4% reduction in peak period run time
20% reduction in peak period headways

R7 (Trenton):

10% reduction in peak period run time
40% reduction in peak period headways

The assumptions for the R7 and R3 lines were based on numbers provided by the transit consultants working on the I-95 project. They provided a range of peak period run time and headway reductions that could occur if certain physical and operational improvements were made. The ranges were as follows:

R7: 5-10% reduction in average peak period run time
20-40% reduction in average peak period headway

R3: 3-5% reduction in average peak period run time
15-25% reduction in average peak period headway

The high end of the range was chosen by DVRPC for the analysis. Since no numbers were provided for the R5, the average of the ranges given for the R3 were used. More conservative numbers were used on the R5 because current service on this line is already very good.
Where routes joined on common links, the lower travel time savings was used.

Travel and Emissions Analysis:

Analysis of travel and emissions impacts occurred as follows:

- DVRPC modified the appropriate transit links in the transit network.
- DVRPC calculated mode choice impacts through the regional mode choice model.
- The revised trip table was assigned to the regional 1996 no-build network.
- Revised assignments were sent to COMSIS for emissions estimation with PPAQ.

Cost Methodology:

The same approach was used as with TCM 6. Additional rail vehicles would be required; the capital cost per passenger = $2.57, based upon the purchase of a $2.5 million self-propelled electric car and a thirty year useful life at an 8% discount rate. Operating revenue is the system-wide average, 44% of operating expense.